

## WHAT IS CLAIMED IS:

**[c01]** An electronic device comprising:

(a) a first electrode;

(b) a second electrode that comprises:

(1) a first layer comprising at least a halide compound of at least a metal selected from the group consisting of alkali metals and alkaline-earth metals; and

(2) a second layer comprising an electrically conducting material; and

(c) at least an electronically active material disposed between the first electrode and the second electrode;

wherein the second layer is disposed between the first layer and the electronically active material of the electronic device.

**[c02]** The electronic device according to claim 1, wherein the first layer of the second electrode comprises at least a halide compound of alkali metals.

**[c03]** The electronic device according to claim 1, wherein the first layer of the second electrode comprises at least a fluoride compound of alkali metals.

**[c04]** The electronic device according to claim 3, wherein the first layer of the second electrode comprises at least a fluoride compound of an alkali metal selected from the group consisting of sodium and potassium.

**[c05]** The electronic device according to claim 4, wherein the first layer of the second electrode has a thickness in a range from about 1 nm to about 100 nm.

**[c06]** The electronic device according to claim 1, wherein the second layer of the second electrode comprises a material selected from the group consisting of

aluminum, silver, gold, tin, calcium, magnesium, yttrium, scandium, elements of lanthanide series, mixtures thereof, and alloys thereof.

**[c07]** The electronic device according to claim 1, wherein the second layer of the second electrode comprises aluminum.

**[c08]** The electronic device according to claim 7, wherein the second layer of the second electrode has a thickness in a range from about 1 nm to about 40 nm.

**[c09]** The electronic device according to claim 1, wherein the first electrode comprises a metal oxide selected from the group consisting of indium tin oxide ("ITO"), tin oxide, indium oxide, zinc oxide, indium zinc oxide, zinc indium tin oxide, antimony oxide, and mixtures thereof.

**[c10]** The electronic device according to claim 1, wherein the first electrode comprises at least a metal selected from the group consisting of silver, copper, tungsten, nickel, cobalt, iron, selenium, germanium, gold, platinum, and aluminum.

**[c11]** The electronic device according to claim 1, wherein the electronic device is an organic light-emitting device, and the opto-electronically active material is selected from the group consisting of poly(N-vinylcarbazole) ("PVK"); poly(alkylfluorene), poly(paraphenylene), polysilanes, 1,3,5-tris{n-(4-diphenylaminophenyl)phenylamino}benzene, phenylanthracene, tetraarylethene, coumarin, rubrene, tetraphenylbutadiene, anthracene, perylene, coronene, and derivatives thereof.

**[c12]** The electronic device according to claim 1, wherein the electronic device is an organic light-emitting device, and the electronically active material is an opto-electronically active material and is selected from the group consisting of aluminum-acetylacetonate, gallium-acetylacetonate, indium-acetylacetonate, aluminum-(picolymethylketone)-bis{2,6-di(t-butyl)phenoxide}, and scandium-(4-methoxy-picolymethylketone)-bis(acetylacetonate).

**[c13]** The electronic device according to claim 1, wherein the electronic device is an organic light-emitting device, and the electronically active material is an opto-

electronically active material and is selected from the group consisting of tris(8-quinolinolato) aluminum and derivatives thereof.

**[c14]** The electronic device according to claim 1, further comprising an additional layer that comprises a substantially transparent, electrically conducting material disposed on the first layer of the second electrode.

**[c15]** The electronic device according to claim 14, wherein the second layer of the second electrode comprises aluminum and has a thickness in the range from about 1 nm to about 40 nm, and the additional layer comprises a metal oxide selected from the group consisting of ITO, tin oxide, indium oxide, zinc oxide, indium zinc oxide, zinc indium tin oxide, antimony oxide, and mixtures thereof.

**[c16]** The electronic device according to claim 15, wherein the first electrode comprises a metal oxide selected from the group consisting of ITO, tin oxide, indium oxide, zinc oxide, indium zinc oxide, zinc indium tin oxide, antimony oxide, and mixtures thereof.

**[c17]** The electronic device according to claim 16, wherein the electronic device is a photovoltaic ("PV") cell, and the electronically active material is a PV material.

**[c18]** An light-emitting device comprising:

(a) a first electrode;

(b) a second electrode that comprises:

- (1) a first layer comprising at least a fluoride compound of at least a metal selected from the group consisting of sodium and potassium, the first layer having a thickness in a range from about 1 nm to about 100 nm; and
- (2) a second layer comprising aluminum and having a thickness in a range from about 1 nm to about 40 nm;; and

- (c) an organic light-emitting material disposed between the first electrode and the second electrode, the organic light-emitting material comprising a polyfluorene;

wherein the second layer is disposed between the first layer and the organic light-emitting material of the electronic device.

**(19)** A method of making an electronic device, the method comprises:

- (a) forming a compound electrode, which comprises a first layer comprising at least a halide compound of at least a metal selected from the group consisting of alkali metals and alkaline-earth metals; and a second layer comprising an electrically conducting material;
- (b) disposing an electronically active material on the second layer of the compound electrode; and
- (c) forming an additional electrode on the electronically active material.

**[c20]** The method according to claim 19, wherein the at least a halide compound is a fluoride compound of an alkali metal.

**{c21}** The method according to claim 19, wherein the second layer of the compound electrode comprises a metal selected from the group consisting of aluminum, silver, gold, tin, calcium, magnesium, yttrium, scandium, elements of lanthanide series, mixtures thereof, and alloys thereof.

**[c22]** The method according to claim 19, wherein said forming the compound electrode comprises depositing an electrically conducting material on the first layer comprising the halide compound.

**[c23]** The method according to claim 21, wherein the step of depositing is carried out by a method selected from the group consisting of physical vapor deposition, chemical vapor deposition, and sputtering.

**[c24]** A method of making an electronic device comprising:

- (a) providing a first substrate;
- (b) forming a first layer on the first substrate, the first layer comprising at least a halide compound of at least a metal selected from the group consisting of alkali metals and alkaline-earth metals;
- (c) forming a second layer on the first layer, the second layer comprising an electrically conducting material;
- (d) forming a third layer on the second layer, the third layer comprising an electronically active material; and
- (e) forming a fourth layer on the third layer, the fourth layer comprising a substantially transparent, electrically conducting material.

**[c25]** The method according to claim 24, wherein the at least a halide compound is a fluoride compound of an alkali metal.

**[c26]** The method according to claim 24, wherein the second layer comprises a metal selected from the group consisting of aluminum, silver, gold, tin, mixtures thereof, and alloys thereof.

**[c27]** The method according to claim 24, wherein the first layer and the second layer are formed by a method selected from the group consisting of physical vapor deposition, chemical vapor deposition, and sputtering.

**[c28]** The method according to claim 24, wherein the third layer is formed by a method selected from the group consisting of spin coating, spray coating, dip coating, roller coating, physical vapor deposition, and ink-jet printing.

**[c29]** A method of making an electronic device comprising:

- (a) forming a first article, said forming the first article comprising: (1) providing a first substrate; (2) forming a first layer on the first substrate, the first layer comprising at least a halide compound of at least a metal selected from the group consisting of alkali metals and alkaline-earth metals; (3) forming a second layer on the first layer, the second layer comprising an electrically conducting material; and (4) forming a third layer on the second layer, the third layer comprising an electronically active material;
- (b) forming a second article, said forming the second article comprising (1) providing a second substrate; and (2) forming a fourth layer on the second substrate, the fourth layer comprising a substantially transparent, electrically conducting material; and:
- (c) laminating together the first article and the second article such that the fourth layer is disposed adjacent to the third layer..

[30] The method according to claim 29, wherein the step of laminating comprises applying pressure to the first article and the second article.

[31] The method according to claim 29, wherein the step of laminating comprises applying heat to the first article and the second article.

[32] A method of making an electronic device comprising:

- (a) forming a first article, said forming the first article comprising: (1) providing a first substrate; (2) forming a first layer on the first substrate, the first layer comprising at least a halide compound of at least a metal selected from the group consisting of alkali metals and alkaline-earth metals; (3) forming a second layer on the first layer, the second layer comprising an electrically conducting material;
- (b) forming a second article, said forming the second article comprising: (1) providing a second substrate; and (2) forming a fourth layer on the second substrate, the fourth layer comprising a substantially transparent, electrically

conducting material; and (3) forming a third layer on the second layer, the third layer comprising an electronically active material; and

- (c) laminating together the first article and the second article such that the second layer is disposed adjacent to the third layer.

[33] The method according to claim 32, wherein the step of laminating comprises applying pressure to the first article and the second article.

[34] The method according to claim 32, wherein the step of laminating comprises applying heat to the first article and the second article.

[35] A method of making an electronic device comprising:

- (a) forming a first article, said forming the first article comprising: (1) providing a first substrate; (2) forming a first layer on the first substrate, the first layer comprising at least a halide compound of at least a metal selected from the group consisting of alkali metals and alkaline-earth metals; (3) forming a second layer on the first layer, the second layer comprising an electrically conducting material; and (4) forming a protective layer on the second layer, the protective layer comprising a material that is capable of being removed to expose the second layer;
- (b) removing the protective layer to expose the second layer,
- (c) forming a third layer on the second layer, the third layer comprising an electronically active material; and
- (d) forming a fourth layer on the third layer, the fourth layer comprising a substantially transparent, electrically conducting material.

[36] The method according to claim 35, wherein said removing is carried out by a method selected from the group consisting of heating and laser ablation.

[37] A compound electrode comprising:

- (a) a first layer comprising at least a halide compound of at least a metal selected from the group consisting of alkali metals and alkaline-earth metals; and
- (b) a second layer comprising an electrically conducting material; wherein the second layer is in contact with an electronically active material.

[38] The compound electrode according to claim 37, wherein the first layer of the compound electrode comprises at least a halide compound of alkali metals.

[39] The compound electrode according to claim 37, wherein the first layer of the compound electrode comprises at least a fluoride compound of alkali metals.

[40] The compound electrode according to claim 37, wherein the first layer of the compound electrode comprises at least a fluoride compound of an alkali metal selected from the group consisting of sodium and potassium.

[41] The compound electrode according to claim 40, wherein the first layer of the compound electrode has a thickness in a range from about 1 nm to about 100 nm.

[42] The compound electrode according to claim 37, wherein the second layer of the compound electrode comprises a metal selected from the group consisting of aluminum, silver, gold, tin, calcium, magnesium, yttrium, scandium, elements of lanthanide series, mixtures thereof, and alloys thereof.

[43] The compound electrode according to claim 37, wherein the second layer of the compound electrode comprises aluminum.

[44] The compound electrode according to claim 43, wherein the second layer of the compound electrode comprises aluminum and has a thickness in a range from about 1 nm to about 40 nm.